Application No.: 10/054,755
Filed: November 12, 2001
Reply to Office Action of January 24, 2004

AMENDMENTS TO THE SPECIFICATION:

Please replace paragraph [0091] with the following rewritten paragraph:

--[0091] As shown in FIG. 5, a space 80 having a given width in a thickness direction of a casing cover 44A is defined at the center portion of the casing cover 44A with the end surface 31a of the rotor 31 by forming a recess on the surface of the casing cover 44A mating with the end surface 31a of the rotor 31. A cover piston 81 is engaged with the peripheral wall defining the space 80 in gas tight fashion for reciprocal motion in the thickness direction, namely toward and away from the end surface 31a of the rotor 31. An air cylinder 82 is mounted on the casing cover 44A in coaxial relationship with the cover piston 81 by mounting bolts 119 ~~83~~. The air cylinder 82 is constructed with a cylinder body 82a, a cylinder cover 86 located on the side of the casing cover 44A, a cylinder cover 87 on the opposite side, a piston 88 slidingly reciprocating within the cylinder body 82a, a piston rods 83a and 83b (which will be identified by reference numeral 83 as generally referred to) extending from both sides of the piston 88, and inlet and outlet ports 91 and 92 communicated with forward drive side and reverse drive side cylinder chambers 89 and 90 defined on both sides of the piston 88. The cylinder cover 86 on the side of the casing cover 44A may be formed to be common with the casing cover 44A. Also, the cylinder cover 86 can be provided separately on the side of the air cylinder 82. In this case, the space 80 of the casing cover 44A is formed through the casing cover 44A. On the other hand, the cylinder cover 86 formed separately on the side of the air cylinder 82 can serve as the casing cover 44A and the cylinder cover 86 and the casing cover can be formed integrally with each other. In this case, the cylinder cover 86 of the air cylinder is mounted directly on the main casing 43 as the casing cover 44A by the bolts.--

Please replace paragraph [0093] with the following rewritten paragraph:

-- [0093] A lock cylinder 85 is coaxially mounted to the air cylinder 82, as shown in FIG. 5. A lock bolt 84 is threadingly engaged with the lock cylinder 83. The lock bolt may abut against a tip end surface of the piston rod 83b of the air cylinder 82 and is movable back and forth along the motion direction of the piston rod 83b. A lock nut 98 46 is threadingly engaged on the lock

bolt 84, for locking the lock bolt 84 at a predetermined position. The lock cylinder 85 is not limited to a cylindrical shape but can be any appropriate shape. The lock cylinder is only required to be any appropriate shape of the frame body, to which the lock bolt 84 is threadingly engaged for a back and forth linear motion. On the other hand, while this embodiment employs the piston rod 83b of the air cylinder to extend outwardly through the cylinder cover 87, it is also possible to engage the lock bolt 84 with the cylinder chamber 89 from the cylinder cover 87 to abut the tip end portion of the lock bolt onto the piston 88 instead of providing the piston rod 83b.–

Please replace paragraph [0094] with the following rewritten paragraph:

--[0094] FIG. 6 shows a modification of another embodiment of the rotary pump, in which the shape of the cover piston 81A is to be engaged with the space 80 in gas tight fashion. In the embodiment shown in FIG. 5 is an end surface 81a at one side of the rotor of the cover piston 81. In contrast to this, the present embodiment of the invention as shown in FIG. 6 has the cover piston 81A, in which a head portion 99a of the bolt 99 is projected from the rotor 31. Therefore, a recessed portion 100 is provided for, in which a head portion 99a of the bolt 99 is projected from the rotor 31. Therefore, a recessed portion 100 is provided for receiving the head portion 99a of the bolt 99. In this construction of the rotary pump, a rotor drive shaft 34 (34A, 34B) ~~117~~ is engaged at the center portion of the rotor 21 for mounting the rotor 31 on the rotor drive shaft 34 ~~117~~. Across a stopper plate 101, the bolt 99 is threadingly engaged with the threaded hole 102 provided on the end surface of the rotor drive shaft 34 ~~117~~. Thus, the rotor 31 is mounted on the rotor drive shaft.--

Please replace paragraph [0097] with the following rewritten paragraph:

--[0097] Upon automatic operation by the air cylinder 82, the lock bolt 84 of the lock cylinder 85 is retracted from the tip end surface of the piston rod 83b at the right side of the air cylinder 82 in the drawing. During operation of the rotary pump, the lock bolt 84 of the lock cylinder 85 can be kept in contact with the tip end surface of the piston rod 83 to prevent the cover pistons 81 and 81A from being retracted from the end surface 31a of the piston to reduce pumping effect even

when the internal pressure of the pumping chamber 42 ~~32~~ is elevated to be higher than or equal to a predetermined pressure to overcome the biasing force of the piston 88 of the air cylinder 82.--

Please replace paragraph [0098] with the following rewritten paragraph:

--[0098] Upon washing the pumping chamber 42 at the end of operation of the pump for a day, a gripping portion of the lock bolt 84a ~~42~~ is operated to retract the lock bolt 84 from the tip end surface of the piston rod 83 and also, the air is introduced into the reverse side cylinder chamber 90 under pressure and the air in the cylinder chamber 89 on the opposite side is discharged through the outlet port 92, and in conjunction therewith the air in the space 80 defined by the casing cover 44A 44 and the cover piston 81 is discharged through an air discharge opening 103. By this, as shown in FIG. 7 or FIG. 8, the piston 88 is moved toward right in the drawing. By this, the cover pistons 81 and 81A connected to the piston rod 83a are retracted away from the end surface 31a of the rotor 31 to define a large gap 104 between the cover piston 81 and 81A and the end surface of the rotor 31. By feeding the washing water into the pumping chamber 42, large amount of the washing water will flow as shown by arrow and discharged through the discharge port 51. Larger amount and higher flow velocity will result in higher washing effect to effectively improve the washing effect for the pumping chamber 42, particularly the end surface 31a of the rotor 31 and the inner end surface 44a of the casing cover 44A 44 opposed to the end surface 31a.--

Please replace paragraph [0100] with the following rewritten paragraph:

–[0100] On the other hand, in case of manual operation, it is possible not to use the air cylinder with maintaining the inlet and outlet port in free condition and use only lock cylinder to maintain the cover pistons 81 and 81A in flush with the casing cover 44A 44 by the contact pressure for the piston rod 83b of only the lock bolt 84. In this case, while the lock cylinder 85 is mounted on the casing cover 44A 44 through the air cylinder 82, it is also possible to omit the air cylinder to directly secure the lock cylinder 85 onto the casing cover 44A 44 by means of bolts to abut the

lock bolt 84 of the lock cylinder 85 to the portion projecting from the casing cover ~~44A~~ 44 (rod portion 83a).--

Please replace paragraph [0104] with the following rewritten paragraph:

--[0104] FIG. 9 shows a further embodiment of the rotary pump according to the present invention. In the former embodiment, only one air cylinder 82 is provided. In contrast to this, the embodiment 82A of FIG. 9 is provided with another air cylinder mounted by bolts 105, in addition to the air cylinder 82. Respective pistons ~~88~~ ~~36~~ and 106 are connected to piston rod 108 extending through a common cylinder cover 107. The lock bolt 84 is threadingly engaged with the cylinder cover 109 of the later air cylinder 82. In the embodiment of FIG. 9, two air cylinders 82 and 82A are connected with each other. However, more than two air cylinders can be employed. On the other hand, in the embodiment 82A of FIG. 9, the lock bolt 84 is threadingly engaged with the rearmost air cylinder. It is also possible to mount the air 10 cylinder 82A at the rearmost position, to threadingly engage the lock bolt 84 and to contact the lock bolt onto the piston or the piston rod as shown in FIGS. 5 and 6.--

Please replace paragraph [0105] with the following rewritten paragraph:

--[0105] In the embodiment 82A of FIG. 9, by introducing air from an inlet portion 110 of the later air cylinder 82A into the forward cylinder chamber 111 under pressure, the air is supplied to the forward cylinder 89 of another air cylinder through a through hole 112 provided in the piston rod 108 to push the pistons 88 and 106 of both air cylinders 82 and 82A simultaneously. Therefore, the cover pistons 81 and 81A are held by both pistons 88 and 106 to maintain the cover pistons 81 and 81A at the position opposing to the pumping action position of the end surface 31a of the rotor 31 at greater force. At this time, as discussed above, the cover piston 81 and 81A are held at predetermined action position by the lock bolt 84 as required. Inlet and outlet ports 113 and 114 provided in reverse side cylinder chambers 90 and 115 of both air cylinders 82, and a ventilation aperture ~~103~~ ~~116~~ is provided in the space 80.--